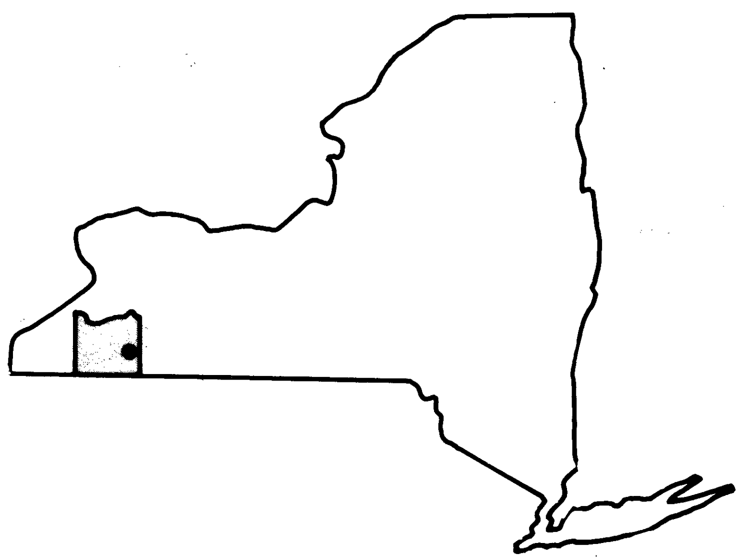
FLOOD INSURANCE STUDY

TOWN OF ISCHUA, NEW YORK
CATTARAUGUS COUNTY



FEBRUARY 1978

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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FLOOD INSURANCE STUDY
TOWN OF ISCHUA, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Town of Ischua, Cattaraugus County, New York, and to aid in the administration of the Flood Insurance Act of 1968, and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the Town of Ischua to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of the information will be made by local and regional planners in their efforts to promote sound land use, and flood plain development.

1.2 Coordination

At a meeting held July 31, 1975, with representatives of the FIA, the Town of Ischua, the Cattaraugus County Planning Board, the New York State Department of Environmental Conservation, the U. S. Army Corps of Engineers (COE), and the U. S. Department of Agriculture, Soil Conservation Service (SCS), the purpose of the Flood Insurance Study was explained.

A search for basic data was made at all levels of government. The SCS has sub-basin information in the Olean Creek Basin which was used as a base for the hydraulic and hydrologic analyses. The U. S. Geological Survey (USGS) was contacted to obtain contour maps for the area and flow information. Flow information was limited due to a lack of gaging stations in the area.

On November 17, 1976, a meeting was held with officials of the town to obtain additional local input. The final Consultation and Coordination meeting was held on February 15, 1977, to present the final draft of this Flood Insurance Study for review. Present at this meeting were town officials, interested local residents and representatives of the FIA and the New York State Department of Environmental Conservation. No comments requiring changes to the draft report were received.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the New York State Department of Environmental Conservation for the Federal Insurance Administration under Contract No. H-3856. This work, which was completed in March 1977, covered all flooding sources in the Town of Ischua.

2.0 AREA STUDIED

2.1 Scope of Study

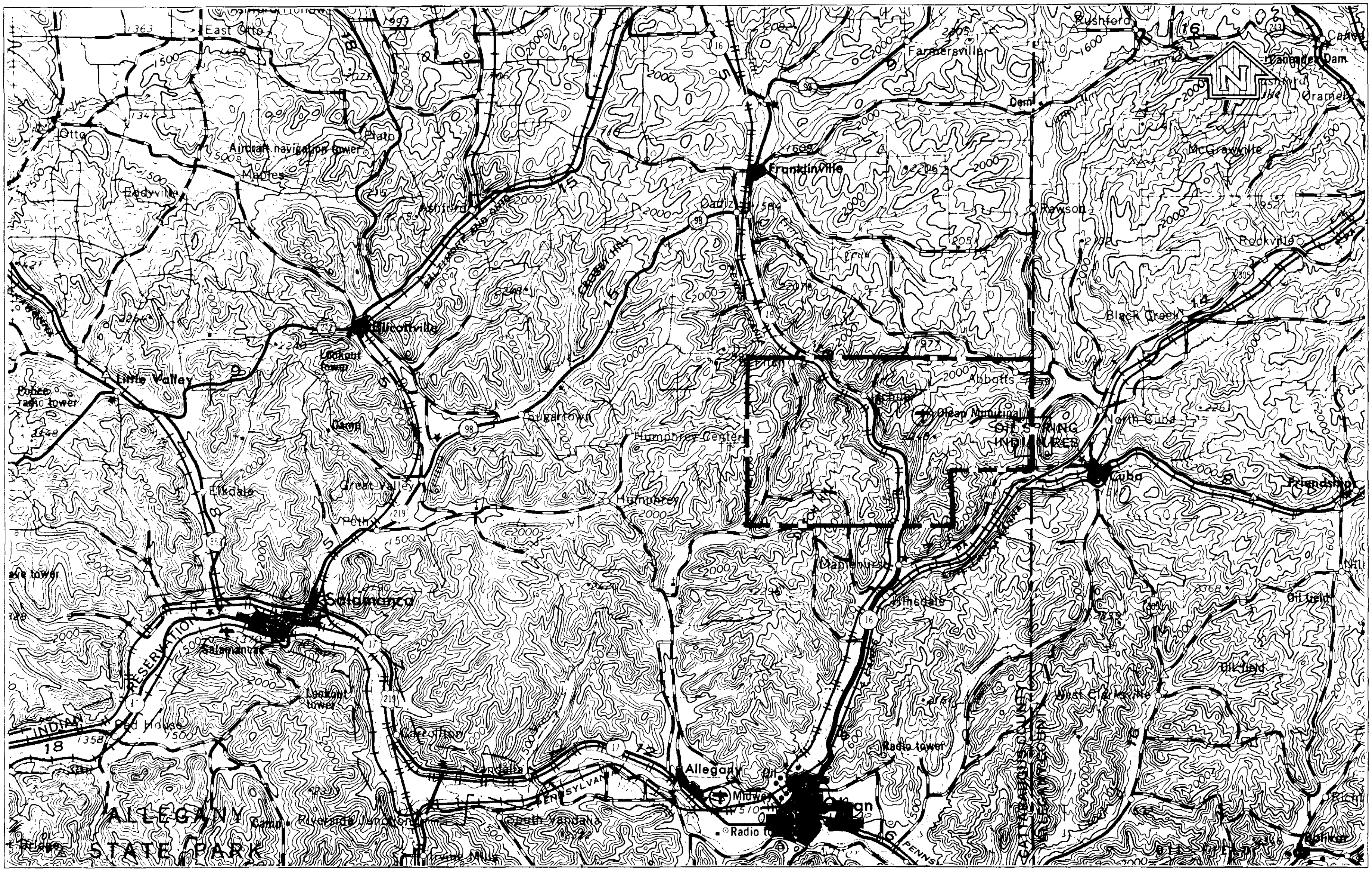
This Flood Insurance Study covers the Town of Ischua. The area of study is shown on the Vicinity Map (Figure 1). Excluded from the study is the Oil Spring Indian Reservation located in the eastern portion of the town.

The limits of the detailed and approximate studies in the Town of Ischua, New York, were determined by the FIA after consultation with the community and the study contractor. Ischua Creek, with a total length of 6.15 miles within the community, was studied by detailed methods. This area was selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years through March 1980.

Approximate methods of analysis were used to study those areas having low development potential and/or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the FIA. Four small tributaries, totaling 1.07 miles in length and which have their confluence with Ischua Creek within the town boundaries, were to be studied by approximate methods. These include Tributaries 2, 3, 4, and 10 as designated on the maps. Approximate flood boundaries were delineated on eight additional small streams as shown on the FIA Flood Hazard Boundary Map (Reference 1).

2.2 Community Description

The Town of Ischua is located on the eastern edge of Cattaraugus County in western New York State, approximately 10 miles north of of the City of Olean, and 70 miles southeast of the City of Buffalo.



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Federal Insurance Administration	APPROXIMATE SCALE 0 4 8 12 16 MILES
TOWN OF ISCHUA, NY (CATTARAUGUS CO.)	**VICINITY MAP**

FIGURE 1

Approximately half of the Oil Spring Indian Reservation is located in the eastern portion of the town. The town is bounded on the north by the Towns of Franklinville and Lyndon, on the east by the Town of Cuba, on the south by the Town of Hinsdale, and on the west by the Town of Humphrey.

The town is generally agricultural in nature with a small residential center located in the hamlet of Ischua. The population of the town has remained fairly constant. At the time of the 1970 census (Reference 2), the population was 655, the same as it was five decades ago, although there have been several fluctuations in between.

Climate is typical of the temperate continental with some variations due to elevation differences. Average January and July temperatures are 25°F and 66°F, respectively, with an average annual temperature of 44°F. Precipitation averages 42" per year, of which approximately 23" becomes runoff. Monthly precipitation varies from an average of 1.7 inches in November to 7.8 inches in June.

Cattaraugus County is characterized by two distinct physiographic regions: the Northwestern Appalachian Plateau Border and the Allegheny Plateau (Reference 3). The Town of Ischua is located on the Northwestern Appalachian Plateau Border which is set off because of the smooth rolling topography and considerably lower elevations than those on the Allegheny Plateau. The southern boundary of the Plateau Border follows the trend of the Allegheny River but is four to six miles north of the river.

The soils within the town strongly show the effects of past glacial action. Along the valley bottoms the soils are well drained and fertile as a result of alluvial deposits. In the upland areas the soils have been formed from local materials deposited as glacial till, with the result that the upland soils are thin with numerous gravel lenses and rock outcroppings. The resulting soil is generally low in fertility, poorly drained, and strongly acidic.

The primary watercourse within the town is Ischua Creek, which is formed in the Town of Machias, Cattaraugus County, and flows in a southerly direction through the town, to its junction with Oil Creek to form Olean Creek in the Town of Hinsdale. Flood plain use is primarily agricultural with some scattered residences located within the flood plains. Olean Creek continues flowing southerly to its junction with the Allegheny River in the City of Olean. The Allegheny River, which rises in Potter County, Pennsylvania, flows in a wide loop through a portion of New York State before joining with the Monongahela River at Pittsburgh to form the Ohio River.

Portions of Ischua Creek within the town are shown in the photographs which are Figures 2 and 3.

2.3 Principal Flood Problems

The main flood season for the Town of Ischua is usually January through April. Most of these floods are the result of heavy rains and snow melt. Large floods, however, may occur at any time.

Flood stage records and high water marks have been accumulated by the COE for the stream under study for the 1967 and 1972 floods and high water profiles have been plotted by that agency (Reference 4). There is not sufficient information on either of these events to allow an estimate of their recurrence interval.

The floods of 1967 were the highest of record on Olean Creek and Ischua Creek. At the two bridges (Farwell Road and Old Dutch Hill Road) in the Town of Ischua where flood observations were made, the flood crest for the 1967 flood did not reach the low chords of either.

2.4 Flood Protection Measures

There are no formalized flood protection measures and no flood control structures within the study area, nor are any proposed.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the drainage area of the stream.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-

Figure 2 - Ischua Creek looking upstream at Old Dutch Hill Road Bridge.

Figure 3 - Ischua Creek looking downstream at Baxter's Mill Road Bridge.

frequency relationships for floods of the selected recurrence intervals for the stream studied in detail in the community.

For Ischua Creek in the Town of Ischua a synthetic rainfall-runoff relationship method, based on a dimensionless unit hydrograph was used to develop flood flow-frequency relationships. The 24-hour rainfall amounts for frequencies up to 100 years, as obtained from the Rainfall Frequency Atlas (Reference 5) were plotted and the rainfall amount for the 500-year frequency was extrapolated from the resulting graph. The watershed of the stream was divided into subareas to evaluate the hydrologic effects of as many tributaries as would be significant.

The computer program TR-20, (References 6 and 7) developed by the SCS, was used to compute surface runoff. It takes into account conditions affecting runoff such as land use, type of soil (Reference 8), shape and slope of watershed, antecedent moisture condition, etc. It develops a hydrograph and routes the hydrograph through stream channels and reservoirs. The program is designed to combine the routed hydrograph with those from other tributaries and print out the total composite hydrograph peak discharges, and times of occurrence at each desired point in the watershed for each storm evaluated. From this data, frequency discharge, drainage area curves were plotted for each evaluation point.

Values of the 10- 50-, 100-, and 500-year peak discharges were determined for the stream studied in detail. Drainage area peak discharge relationships for this stream are listed in Table 1, Summary of Discharges.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ISCHUA CREEK					
Southern Corporate Limit	112.3	5,500	7,150	7,800	9,400
Northern Corporate Limit	97.4	4,700	6,400	7,000	8,700

Approximate studies were performed for Tributaries 2, 3, 4, and 10 using a flood height drainage area relation developed by the USGS. Approximate flooding on the eight remaining small tributaries was delineated using the FIA Flood Hazard Boundary Map (Reference 1).

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the stream studied in detail in the town was carried out to provide estimates of the elevations of floods of the selected recurrence intervals along this stream.

Cross sections were located at close intervals above and below bridges, at control sections along the stream length, and at significant changes in ground relief, land use, or land cover. Cross section geometry was obtained through field survey as was the base line which was used for horizontal control. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

For Ischua Creek, in the Town of Ischua, roughness coefficients (Manning's "n") were determined by field inspection and based on the National Engineering Handbook, Section 5 (Supplement B) (Reference 9). In arriving at a realistic value due weight was given to the natural materials of the channel, surface irregularity, variations in shape and size of cross sections, characteristics of obstructions such as debris deposits, stumps, exposed roots, boulders, fallen and lodged logs, type of vegetation, and degree of meandering. The roughness coefficients vary from 0.055 to 0.065 for the main channel, and 0.075 to 0.090 for the overbank areas.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals.

Flood profiles on Ischua Creek were calculated using the SCS WSP-2 Water-Surface Profiles Computer Program (Reference 10).

The SCS program which assumes unobstructed flow, uses the standard stop method, with some modifications, to compute profiles between valley sections. All profiles are computed in the upstream direction. Therefore, only subcritical flow, a condition normally characteristic of natural streams, can be analyzed. For any super-critical flows encountered the program will assume critical depth and resume computations.

At any one road restriction, WSP-2 can compute head losses through one bridge opening or up to five culvert openings with different configuration.

For starting profile computations, the tailwater elevations on Olean Creek at the Town of Olean boundary, as supplied by the COE were used. These elevations were determined during the preparation of Flood Insurance Studies for other communities within the Allegheny Basin, which are contiguous to the Allegheny River itself.

Reach lengths for the channel were measured along the centerline of channel between sections and overbank reach lengths were measured along the approximate centerline of the effective out-of-channel flow area.

For Tributaries 2, 3, 4, and 10, studied by the approximate method, use was made of the Flood Height-Drainage Area relation for the 100-year flood which was developed by the Water Resources Division of the USGS and presented in an unpublished staff document. This method yields an approximate 100-year flood height as a depth of water above a contour crossing, or normal water-surface. The relationship used was developed for the Upper Genesee River Basin because no relationship has been developed for the Upper Allegheny Basin in New York State. The Upper Allegheny and Upper Genesee Basins are contiguous and are similar geographically, geologically, and in land use and cover. Approximate studies shown on the remaining tributaries were taken from the FIA Flood Hazard Boundary Map.

All elevations are referenced from the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Mean Sea Level with the 1929 general adjustment; elevation reference marks used in the study are shown on the maps.

The hydraulic analyses for this study are based upon unobstructed flow. The flood elevations on the profiles are valid only if hydraulic structures remain unobstructed, operate properly and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community.

For the stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps developed for this study at a scale of 1:4,800 with a contour interval of five feet (Reference 11). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year flood boundary has been shown.

Boundaries for the streams studied by approximate methods were delineated using these same 1:4,800 scale topographic maps.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding; owing to limitations of the map scale or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this report is presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The floodway presented for Ischua Creek, was computed using "HUD-15" Computer Program (Reference 12). Where special topographic features required it, the floodway was adjusted more toward one side of the stream as necessary. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or colinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the Town of Ischua.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Ischua Creek							
A	2,000	735	3,058	2.55	1,476.5	1,475.5	1.0
B	4,410	139	1,301	5.92	1,484.1	1,483.1	1.0
C	7,750	533	1,409	5.46	1,489.5	1,488.5	1.0
D	10,550	252	1,658	4.64	1,498.5	1,497.5	1.0
E	11,850	412	2,675	2.80	1,500.4	1,499.4	1.0
F	15,050	132	1,236	6.07	1,507.1	1,506.1	1.0
G	18,800	169	1,577	4.75	1,514.8	1,513.8	1.0
H	20,800	285	2,096	3.58	1,519.0	1,518.0	1.0
I	23,600	133	1,396	5.30	1,526.6	1,525.6	1.0
J	26,200	384	2,156	3.34	1,531.2	1,530.2	1.0
K	30,200	186	1,368	5.26	1,540.3	1,539.3	1.0

[1]FEET ABOVE CORPORATE LIMIT

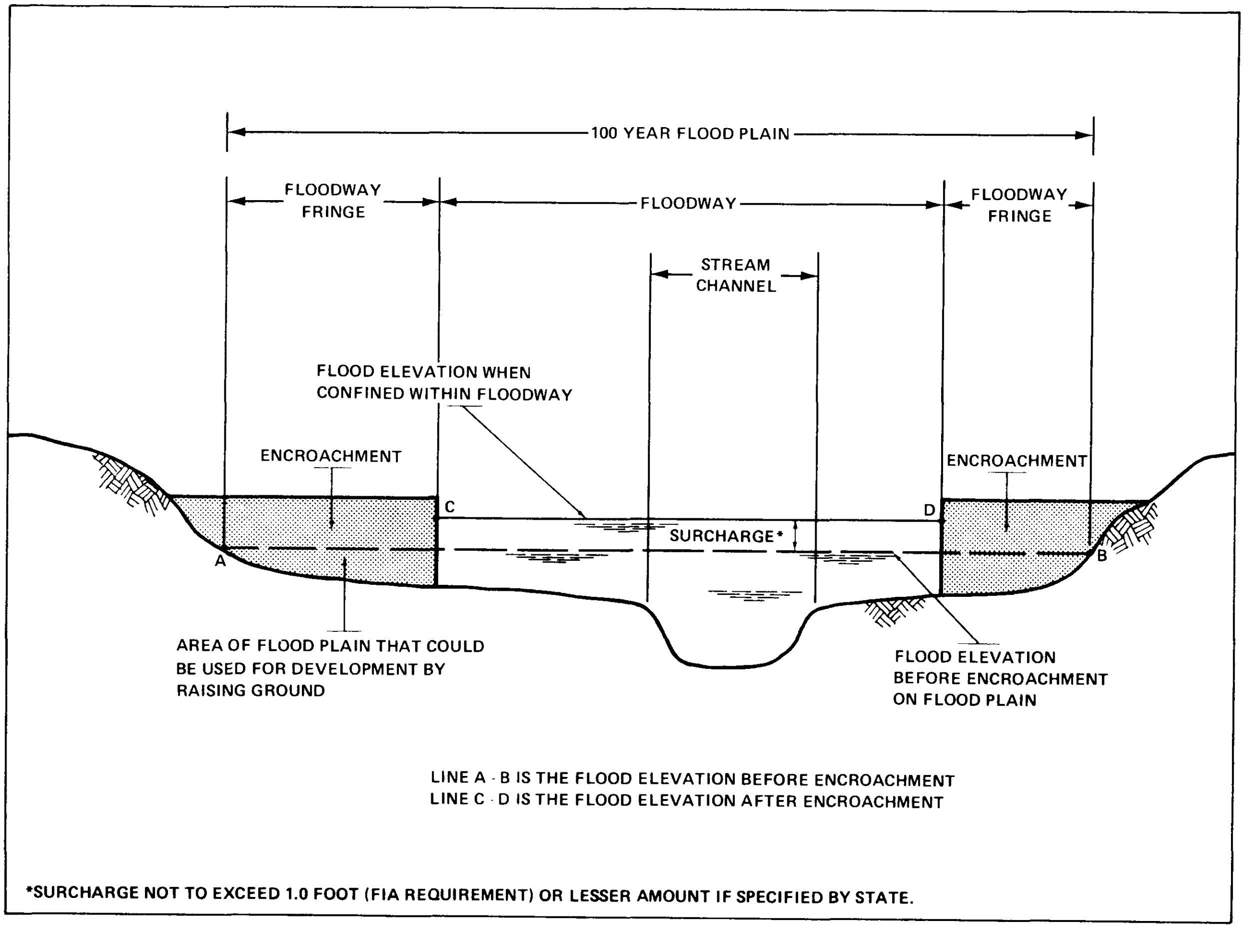
TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF ISCHUA, NY
(CATTARAUGUS CO.)

FLOODWAY DATA

ISCHUA CREEK



FLOODWAY SCHEMATIC **Figure 4**

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot

One reach meeting the above criterion was required on Ischua Creek to establish flood insurance zones for the Town of Ischua. The location of this reach is shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based upon FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire area of study was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods, no base flood elevations shown or FHFs determined.
Zone A3:	Special Flood Hazard Area inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Ischua is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

No other studies of flooding have been performed for the Town of Ischua. Flood Insurance Studies are currently underway by the New York State

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Ischua Creek Reach 1	0002B	-1.5	-0.5	+0.8	015	A3	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT – SEE MAP

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF ISCHUA, NY
(CATTARAUGUS CO.)

FLOOD INSURANCE ZONE DATA

ISCHUA CREEK

TABLE 3

Department of Environmental Conservation for other communities within the Allegheny Basin. The communities of the Town of Franklinville and the Town of Hinsdale are contiguous to the Town of Ischua and are being studied at this time. Hydraulic determinations have been coordinated to insure profile agreemenc between communities.

This study is authoritative for purposes of the Flood Insurance Program.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data are on file for five years (until January 1, 1982) at the New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12233.

8.0 BIBLIOGRAPHY AND REFERENCES

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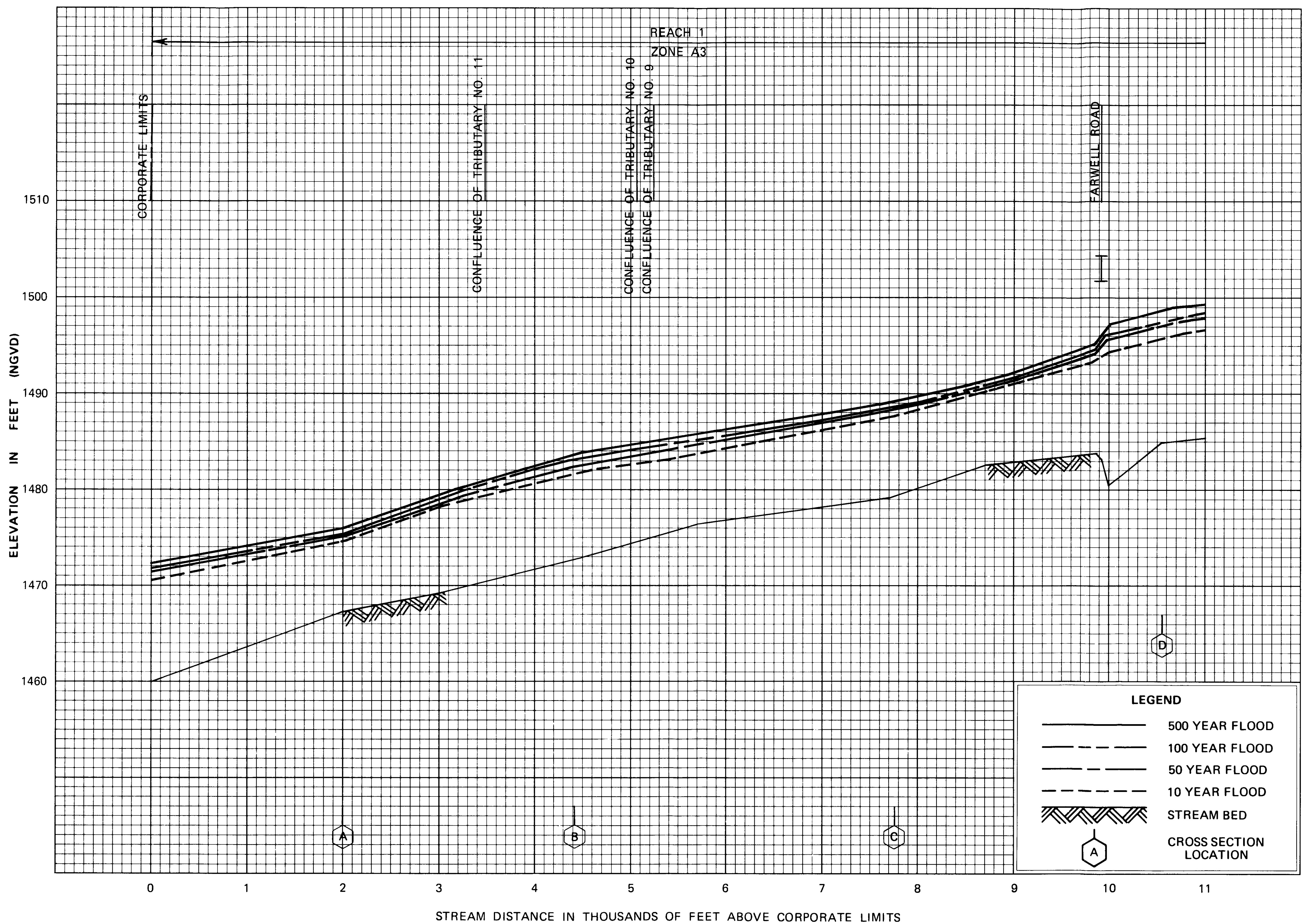

FLOOD PROFILES

ISCHUA CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF ISCHUA, NY
(CATTARAUGUS CO.)

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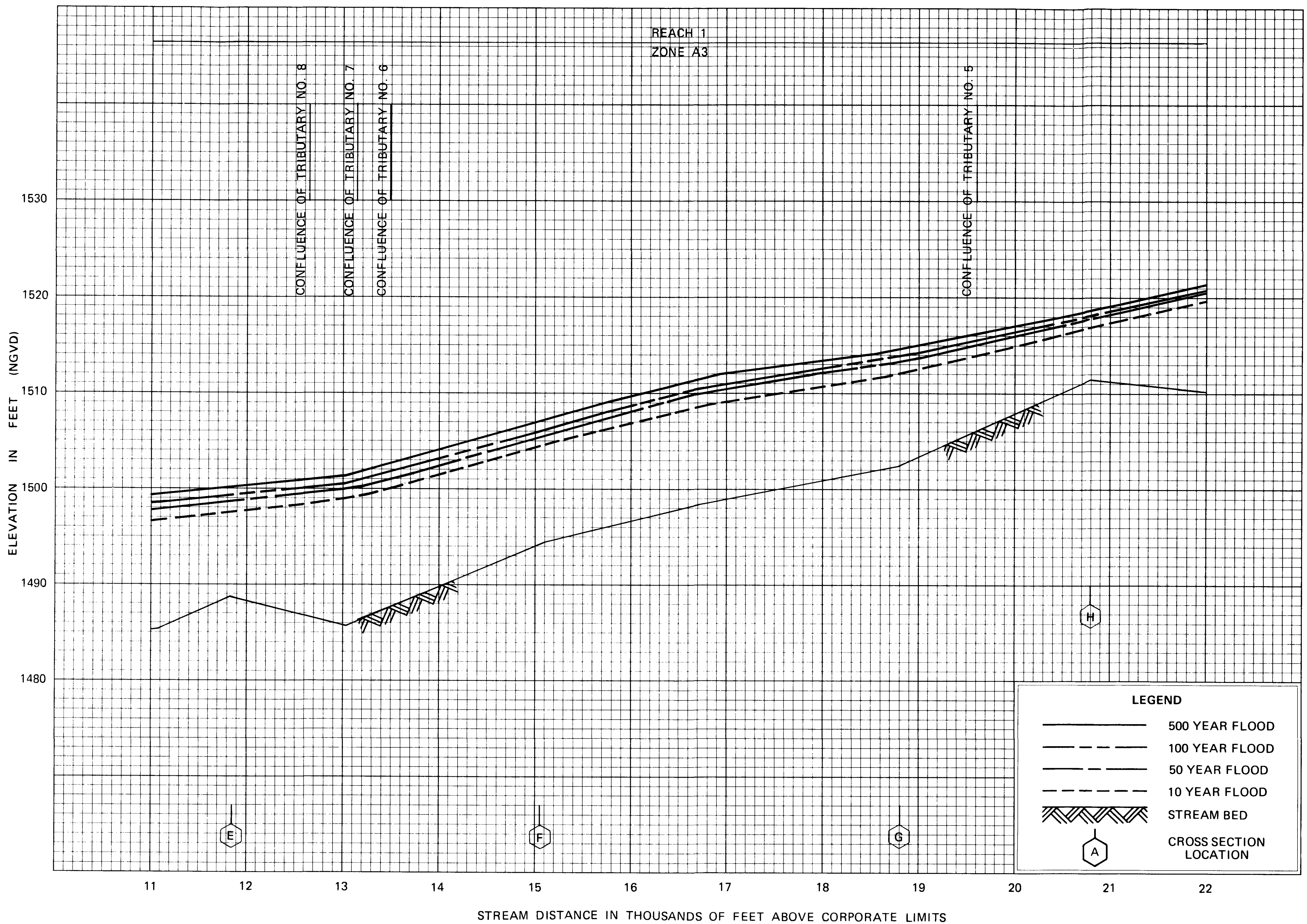

FLOOD PROFILES

ISCHUA CREEK

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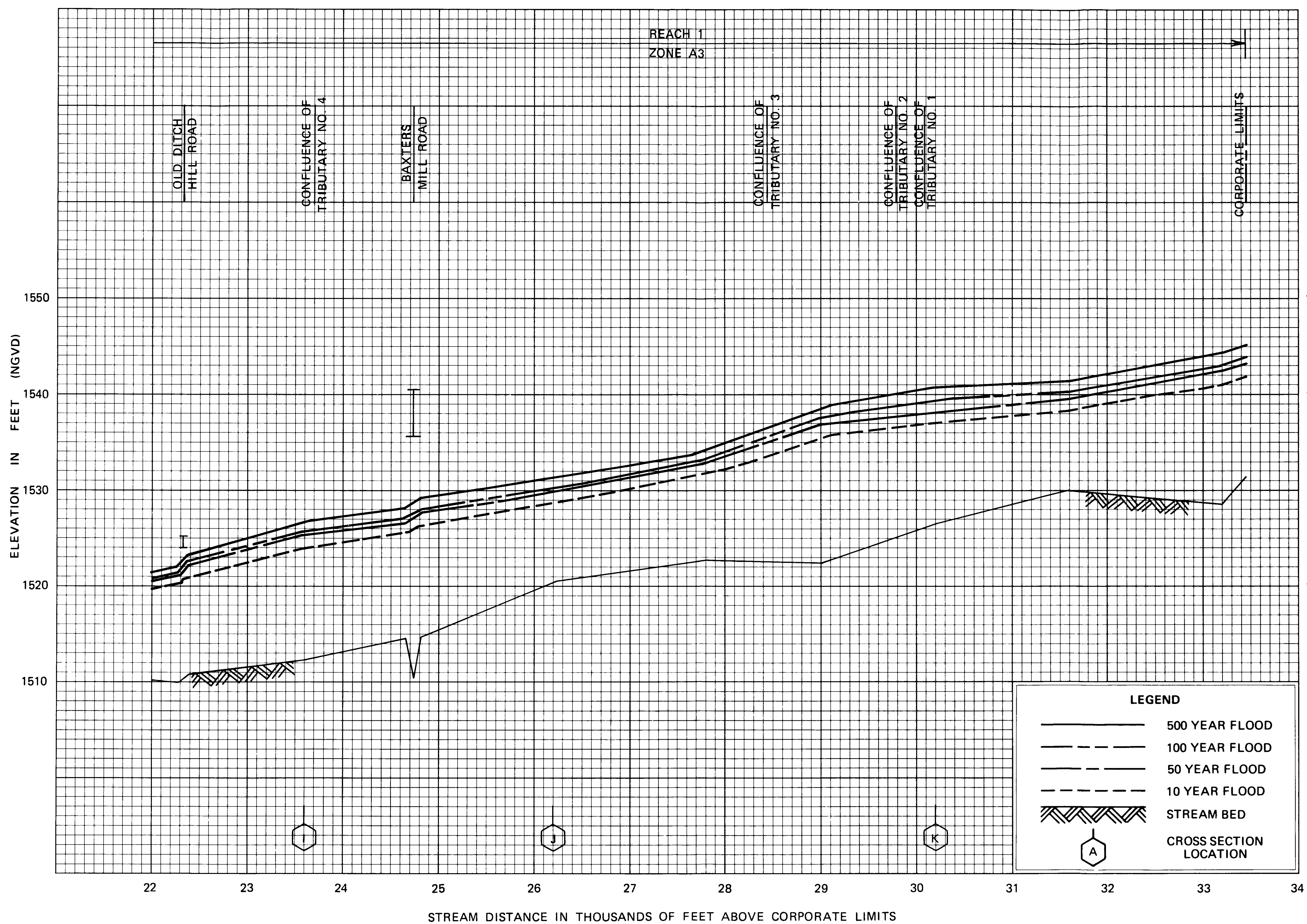

FLOOD PROFILES

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